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Forest Health
Technology
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COMBINE - A software program which generates multiple flight line results from a single flight line

(Developed for use in conjunction with the Forest Service-Cramer-Barry-Grim (FSCBG) spray dispersion model)

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Combine - A software program which generates multiple flight line results from a single flight line

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SUMMARY

COMBINE is a small Fortran program that reads FSCBG (Forest Service Cramer-Barry-Grim) output print files (PRT) to recover single flight line dosage, concentration or deposition results from the dispersion model, then generates multiple flight line dispersion results from them. This program is a temporary utility that will be replaced by code within FSCBG at a future release.

INSTRUCTIONS

COMBINE generates multiple flight line results from the results of a single flight line prediction by FSCBG. The user must develop this single flight line result within FSCBG, saving dosage, concentration or deposition results (drops, mass or volume) along a line of discrete receptors defined perpendicular to the single flight line. In this way an FSCBG simulation of off-target drift from multiple parallel flight lines may be generated in much less computer time by solving for the single flight line result, and combining.

The following procedure must be followed to make use of COMBINE:

1. Discrete receptors (up to 100, the limit in FSCBG) must be placed from the edge of the spray block outward, either in the X or Y directions, plus or minus. Their distances apart may be varied so as to recover detail near the spray block (a procedure that is strongly advised), then their spacing increased to capture as far downwind (off-target) as desired. REMEMBER: the final combined pattern will shorten the downwind distance by the number of flight lines times the swath width, but will combine on top of the entered discrete receptor locations. The first (or last) X or Y location MUST be 0.0; this position marks the edge of the spray block for the COMBINE program. X or Y values may then increase positively or negatively (FSCBG sorts them in ascending order). If the discrete receptors are defined with X variation, the Y values must all be the same. Conversely, if the discrete receptors are defined with Y variation, their X values must all be the same.

2. One flight line is entered into FSCBG, and the appropriate dosage, concentration or deposition flags are set. FSCBG is then run to obtain the dispersion file.

3. In the DISPERSION RESULTS menu the user selects which discrete receptor results to display, then appends these results to the print file. Up to ten separate discrete receptor results (dosage, concentration or deposition in drops, mass or volume) may be appended to the desired print file; the first ten will be processed by COMBINE. When completed, the user then exits FSCBG.

4. A separate one-line file is created that contains three numbers: 1) the number of discrete receptors in the FSCBG simulation; 2) the number of flight lines to overlay (this number is NOT limited to 100 as FSCBG is); and 3) the swath width, in the same units as the discrete receptor distances saved in the print file. This file is named with the same family name as the print file, but with the extension INP. A typical example INP file may look like this:

```
100  55  50.0
```

where this INP file provides the facts that 100 discrete receptors have been defined in the FSCBG calculation; 55 flight lines are to be combined, and the swath width is 50.0 feet (in this particular case, because the discrete receptors were developed with separation distances in feet).

5. The user then invokes COMBINE with the command:

```
COMBINE familyname
```

where familyname is the family name of the INP and PRT files. COMBINE reads both files, then generates up to ten output files (with extension F01, F02, F03, ... , F10

depending on how many results have been appended to the print file) containing the overlapped flight line results in the order in which the user appended them to the PRT file. The first column of numbers is the distance perpendicular to the edge of the spray block (it will ALWAYS increase from 0.0 and will be in the units specified in FSCBG) and the second column (separated by a tab character) will be the combined dispersion results (in the order appended by the user, in the units selected by the user).

6. The user then transfers these results into other graphics packages to recover the downwind multiple flight line dispersion pattern with the one flight line result from FSCBG.

The accompanying diskette contains a sample PRT file (TORDON.PRT), a sample INP file (TORDON.INP) and the two COMBINE results files (TORDON.F01 and TORDON.F02).

ERROR MESSAGES

The errors trapped by COMBINE are the following:

Ill-defined discrete receptor locations: both X and Y distances change as the discrete receptor locations are specified.

Ill-defined downwind distance: the distance to the last downwind discrete receptor is smaller than the spray block to be developed -- data has not been computed far enough downwind off the spray block to enable the program to overlap all of the desired flight lines. The user should remember that the farthest downwind discrete receptor distance must be larger than the number of flight lines times the swath width.

Incorrect number of discrete receptors: the user must define between 10 and 100 discrete receptors; otherwise, the overlapping technique is unnecessary.

Incorrect number of flight lines: the user must define at least five flight lines; otherwise, the overlapping technique is unnecessary.

Incorrect swath width: the user has defined a zero or negative swath width; it would be nice to be more precise here, but that is not possible. The user should remember that the swath width must be in the same length units as the discrete receptor distances; otherwise the overlapped dispersion result will be very difficult to interpret.

No spray block edge defined: the discrete receptor distance X or Y measured perpendicular away from the spray block does not begin with X = 0.0 or Y = 0.0.

Poorly constructed PRT file: the PRT file entered on the command line does not contain the proper discrete receptor dispersion information.

Too few downwind receptors: as in Ill-defined downwind distance, the user has not computed the dispersion far enough downwind to recover an accurate overlapped dispersion result near the spray block edge.